

FURTHER NOTES ON VARIATION IN A NORTH
DORSET COLONY OF THE MEADOW BROWN
BUTTERFLY, *MANIOLA JURTINA* L.

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In a previous article (*Ent. Rec.* 96: 259-263) I discussed the remarkable numbers of aberrations of *M. jurtina* that have appeared in a meadowland colony near Shaftesbury, North Dorset, over the past few years. The following is a summary of the interesting specimens recorded since 1983. In this colony the emergence commences around the second week of June with a trickle of males. The numbers rise up to a peak on or about 13th July when the majority of specimens emerging are female. Numbers then decline leaving a long tail of mostly females lasting into the second week of August. The more sombrely coloured males do not vary in so striking a manner as the females, but both sexes exhibit all types of variation.

The first aberration of 1984 was a fresh male on 24th June in which the underside of the hindwings was darker than type, and more or less unicolorous. This was probably an extreme example of ab *postmultifidus* Lipscomb. The range of expression of this aberration is considerable. Breeding results, which I hope to publish shortly, suggest a multifactorial inheritance pattern, which has a considerable weakening effect. Extreme examples have occurred in females in which the hindwings are almost unicolorous. Such forms have not been recorded in this colony, but two were noted by the late J. C. B. Craske on Gomshall Down in Surrey, and another extreme form, taken by R. E. Stockley, was beautifully illustrated by A. D. A. Russwurm in Howarth's *Butterflies of the British Isles* (pl. 20 fig. 11).

On 25th June, a male which appeared in flight to be one of the frequent bleached forms, turned out to be ab *subtus-albida* Silb. (figure 1) in which the fulvous colouration on the underside of the forewings is replaced by a dirty cream. The fulvous tint to the underside of the hindwings is also absent leaving them grey. The following day two fresh Male ab *postmultifidus* were easily netted as they fed on lesser knapweed, a plant usually in flower during the first two weeks of the flight period, on which the males and the few females present at this time congregate in numbers. Later on, the knapweed is superseded by creeping thistle and water dropwort as these plants reach full bloom.

I was next able to work the area on 12th July when, in oppressive conditions with slight drizzle, I found a fresh and extreme female ab *postmultifidus* sitting low down in the grass. On the same day a female ab *subtus-albida* was netted (figure 2). This form is

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more often seen in the male. The only other major aberration of 1984 was a well marked ab *fracta* Zweigl taken as it rested on the ground. Quite a number of females transitional to ab *postmultifidus* were noted, usually with the hindwing median band narrowed and the forwing fulvous reduced to some extent.

During 1985 I was able to work the area for the majority of the flight period and took the opportunity to carry out some population studies using the mark-release-recapture method: the butterfly numbers peaked on 13th July with around 8100 specimens. The total number in the colony over the whole of the 1985 flight season being about 13500. Considering that the population occupies an area of no more than a couple of acres, the concentration of butterflies per unit area is very high. Casual observations would suggest that all the hayfields in the local area support similar populations. These fields are unsprayed and unfertilised. 1985 was a productive year for aberrations — the first seen being a male on 24th June showing a small area of homoeosis on one hindwing. This consisted of the partial reproduction of the forewing apical spot and a little of the surrounding colouration. At the start of June we enjoyed a fine, sunny spell that was all too short, the weather from then on being the cool, wet conditions that so characterised that summer. When the weather was windy as well, as it often was, working for *jurtina* proved difficult. The butterflies did not feed on the flowers in anything like the expected numbers, sitting instead on the grass stems (the more it rained, the lower they sat!) and when disturbed were carried off by the wind to distant parts of the meadow. On 2nd July, a hot, sunny day, a freshly emerged male ab *sinis-anommata* Verity was captured (figure 3). On the same morning a male ab *decrescens* Leeds was netted. This form has reduced venation, although on this specimen only one hindwing was affected. The most striking forms of this aberration occur in the blues and fritillaries where the black markings join up down the wings where the veins are absent. This character is known to be inherited in the fly *Drosophila*, and there is no reason to suggest that this is not so in butterflies. The capture of an almost identical specimen, albeit a female, in the same area two years ago may support this suggestion.

On the 4th of July I noticed a black male ab *antinigromargopostatrescens* Leeds feeding from water dropwort. This was successfully captured (figure 4) and proved to be similar to a female taken at almost exactly the same spot in 1983 (figured in *Ent. Rec.* 96: 261). On 8th July a second male of this form was noted and the same evening, amongst several females resting on the thistle heads, was a dark, male ab *postmultifidus*.

The 10th of July saw the first of 3 good ab *fracta* Zweigl (figure 5). The first specimen, found feeding on lesser knapweed, also had a shiny upper surface (ab *glabrata* Leeds) — probably a

scale defect. 12th July was a reasonable day and a female from thistles that was transitional to *postmultifidus* on the underside was an extreme *antiauro lancea* Leeds on the upperside – the forewing fulvous being greatly reduced (figure 6). On 13th July I spent some time looking over the thistle heads, and was rewarded with a female specimen showing extreme homoeosis on one hindwing (figure 7). The homoeosis consists of a large area of orange splashes and streaks on the normal pattern of the left hindwing. This fine aberration is less striking when figured in monochrome. During the afternoon my friend, John Simner came to spend a couple of hours in the field and was rewarded with, remarkably, another fine male *postatrescens*, in reasonable condition. By this date, the colony was at full strength and *jurtina* was in greater profusion than I have ever known. One other interesting aberration taken the same evening was a male *anticastanea* Leeds netted as I was leaving the fields. In this aberration, the fulvous of the forewings is darkened to a red-brown. This is very apparent on the underside, and the upperside fulvous circle that surrounds the apical spot was also dark in colour. Although this is only a minor change in the upperside colour pattern it does make the apical spot very much less obvious. In all probability this spot acts as a focus to divert the attention of predatory birds from the body of the insect, and the fulvous ring may serve to accentuate this function.

From 14th to 20th July, only minor varieties were noted, including several female ab *addenda* Mosley (one or two extra black spots below the apical spot of the forewing). Several ab *hueni* Krul were also noted – in this form the fulvous of the upperside of the forewings is replaced by light brown, and the whole ground colour is of a paler greyish-brown colour. On the underside of the forewings the fulvous is covered by a light brown suffusion. On the 20th July one of several females on a thistle head had a black suffusion over the hindwings, being transitional to ab *postatrescens* (figure 8), whilst another seen the same day was ab *transformis* Leeds. In this form the upperside colour is paler than normal with the fulvous replaced by cream. On the underside of this specimen the whole pattern is a creamy colour. The final insects of note were taken on 24th July, and included a well-marked female ab *addenda* and a female ab *antiultrafulvescens* Leeds in which the fulvous of the underside of the forewings is very dark-red, and the remainder of the underside is considerably darker than type.

Of particular interest was the number of bleached forms (ab *partimtransformis* Leeds) that occurred during 1985 – many more than in previous years. Many theories have been advanced to explain the production of bleached insects, with causal factors suggested including humidity, temperature, sudden light and developmental damage. These are somewhat vague, and in all probability there is

a genetic influence on the developing scales. I have noticed that the bleached areas of the wing tend to be especially weak — usually the first area to become chipped or torn. The scale defects on a bleached male are shown on the scanning electron micrograph, (figure 9.) A further interesting observation was the occurrence of a melanic specimen in 1983 followed by five specimens (4 male, 1 female) in 1985. Melanics are very rare, so the appearance of six in three years strongly suggests a genetic influence. The late C. G. Lipscomb bred from a melanic female, obtaining a normal F1 generation but only type females and no males in F2. Melanic forms are often deformed to a greater or lesser extent, and the available evidence would suggest that melanism in *jurtina*, rather than being the simple recessive or dominant encountered in some other Lepidoptera, is a complex, multifactorial condition, which may be sex-linked and is obviously lethal in some combinations. A more thorough breeding programme is required to resolve this problem.

It is well known that butterfly specimens are occasionally encountered with the mark of a bird beak across the wings, but there are few reports of actual observations of birds capturing butterflies. In this colony, in 1985, I observed on several occasions, swallows swooping low over the fields, and taking adult *jurtina* from thistle heads where the butterflies were feeding. At times 8 to 10 swallows were working the fields and, over the whole flight period, must have accounted for a substantial number of butterflies.

An example of double mating was probably seen in 1985. On 16th July I observed a female, previously marked on 8th July, in cop. The specimen must have been at least 8 days old, and it is unlikely that this was the first mating. When sperm is passed from male to female an additional substance, the Receptivity Inhibiting Substance (RIS) is also transferred. This substance suppresses both 'calling' and the adoption of courtship postures by the female. Studies by Ford and Eltringham on the pearl-bordered fritillary suggest that visual factors are predominant in attracting males to females, the pheromones only acting over a very short range. Perhaps second matings occur when the supply of RIS is exhausted?

KEY TO FIGURES

Fig. 1 *ab subtus-albida* Silb. male 25.6.1984; fig. 2 female 12.7.1984; fig. 3 *ab sinis-anommata* Vty. male. 2.7.1985; fig.4 *ab antinigromargo-postatrescens* Leeds male. 4.7.1985; fig.5 *ab fracta* Zweight. female. 20.7.1985; fig.6 *ab antiaurulancea* Leeds female. 12.7.1985; fig.7 homeosis. female. 13.7.1985; fig. 8 transition to *ab postatrescens*. female. 20.7.1985.



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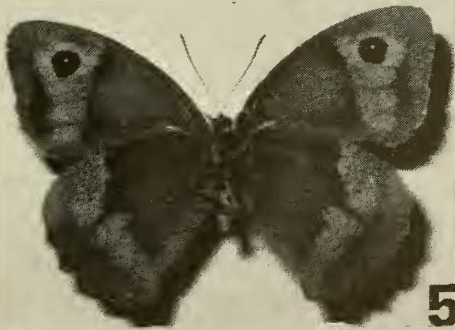
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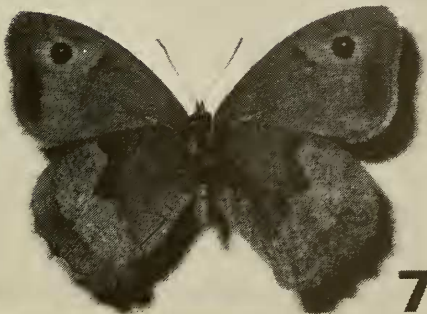
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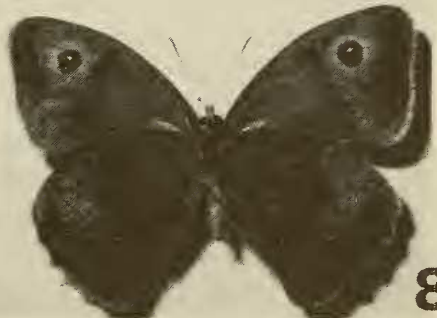
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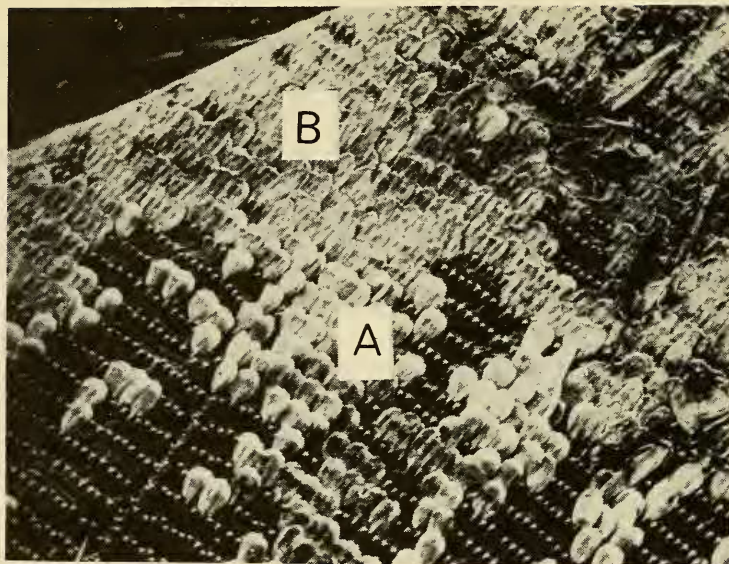


Figure 9 area of right forewing of *ab partim transformis* Leeds A: area of normal scales B: area of deformed, bleached scales Note: some scales have been removed from this specimen. Scale loss is *not* a feature of this aberration. (Scanning microscope x 60).

Acknowledgement

I would like to express my thanks to R. M. Craske for his help in supplying much information on aberrations of *Maniola jurtina*.

References

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PYRGUS MALVAE L. (GRIZZLED SKIPPER) IN MID-JULY —
 I was interested in the note from Mr. A. A. Allen (*Ent. Rec.* 98: 61) in which he reports seeing the above species in W. Norfolk on 14 July 1985. On 16 July this year, in Tugley Wood, Surrey. I also saw a single individual of this species. Likewise, it was in perfect condition. — S. L. MEREDITH — 5 Rutlish Road, Merton Park, London SW19 3AL.